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Abstract

Changes to existing structures and specific design features for new structures are discussed as a means of making buildings usable by the physically handicapped. The author stresses the need for consideration of approaches, entrances and exits, and equipment and facilities which will allow the disabled to enter, leave and work within all types of public buildings. Experiments with wheelchair patients to set up criteria for ramps, floor covering, floor finishing, docr mechanisms and hardware, water ccolers, bathroom facilities, and desks are reported. A detailed wcrk cutline for American Standards Associaticn Project A-117, co-sponsored by the President's Committee on the Emplcyment of the Physically Handicapped and the National Scciety fcr Crippled Children and Adults, is included as an appendix. (RH)

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Design of Buildings to Permit their Use by the Physically Handicapped

By Timothy J. Nugent * Assistant Professor & Director,
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The Problem and Background

Alarming as it may seem, approximately one out of every six people in the United States has a permanent physical disability. Among these are many different causes and manifestations of physical disability and each has its own particular, associated problems.

One of the most frustrating problems of physically disabled individuals are buildings and facilities, supposedly created for the public, that are designed and constructed in such a manner that they prohibit the full participation of the physically disabled. It is equally frustrating to professional people dedicated to rehabilitation to find that architectural barriers prohibit the disabled individual, however well rehabilitated, from pursuing his aspirations, developing his talents, and exercising his skills.

Contrary to what most people think, recent advancements in science and medical technology tend to magnify the problem of increased numbers of the disabled in our country. It is further evident that the situation will get much worse before it gets better. As an example, the telephone and the two-way radio, which most people consider to be far removed from this problem, coupled with modern transportation, bring the first echelon of medical care much closer to the incidence of disaster. Thus, the lives of more people are saved, but many of these become individuals with permanent physical disabilities. As another example, advancements in medical science now make it possible to save many lives, decrease the mortality rate at birth, and increase longevity, all of which greatly increases the numbers of individuals with permanent physical disabilities.

EF 002 670

Also contributing are the advancing machine age, the continued expansion of industry, and the rapidly increasing number of motor vehicles both in total numbers and percentage of ownership. This is emphasized when one compares the number of teen-age drivers today with ten years ago, and it is still further emphasized when one realizes the difficulty in developing adequate road networks to keep pace with increasing motor vehicle traffic. Authorities anticipate more than 200,000 traumatic paraplegics (individuals

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with spinal cord injury resulting in both motor and sensory paralysis and, in most instances, secondary loss of control of organs) per year from automobile accidents.

Increases in leisure time have also contributed to the incidence of such disabilities as traumatic paraplegia. Swimming, boating, or water activities, as one example, create thousands of such disabilities each year. And, labor leaders in both government and the unions predict a 30-hour work week in the not too distant future.

There is tremendous economic significance associated with this problem. In 1952, one out of five of the 64,000 persons in the U.S. rehabilitated through the Federal-State vocational rehabilitation program had been on public assistance rolls, costing the taxpayers about $8,500,000 each year. But, as productive members of society, they earned approximately $22,000,000 in the first year after their rehabilitation. In 1956, 13,000 of the 65,640 rehabilitants were receiving assistance payments at an estimated rate of $11,100,000 per year, a continuing expense. The total cost of restoring these 13,000 persons to productive employment was about $9,600,000, a one-time expense.

The human resources among the permanently physically handicapped are of considerable significance. As a single example, of 209 severely physically handicapped graduates of the University of Illinois, most of them in wheelchairs, six have received Ph.D. degrees, 22 have received Master's degrees, one has received an M.D. degree, and one is an ordained minister. Nine graduates are now on college faculties; others are in the sciences, business, and elementary and secondary teaching. All are serving admirably where needed most. There are countless other examples at various levels in the professions, trades, and skilled and semi-skilled areas of endeavor, but they are just that, "examples!" These are still a small minority, not yet commonplace or normal, but they should be and can be.

These human resources are still being overlooked and neglected while we hysterically cry for subsidization of education in the sciences and bemoan our lack of qualified personnel in various areas of endeavor.

An unnecessarily large portion of our permanently physically handicapped have been institutionalized or are to be found in back rooms, protected and pampered by solicitous parents, relatives and friends. Our experiences and statistics in these two categories are dynamically startling, and truly sad. An unnecessarily large proportion of our permanently physically disabled people have had to be placed in hospital-schools and orthopedic schools for their education. The cost per capita of such schooling is many times the cost per capita when they are included in the regular school system, and the multitude of other benefits to be derived by these people, were they to be properly included in regular schools, reaches on into infinity.

Many of the disabled are afraid to venture forth because of the architectural barriers they encounter. Others have convinced themselves it is better to stay back because they feel they are a burden to others when they attempt to project themselves into normal social settings. In many instances they are a burden, but it is not their fault. Rather, the apathy which has existed concerning this problem is to blame.

Over 60% of those disabled early in life, making application to the University of Illinois, have not had normal schooling and educational opportunities and experiences. Many have not been in school at all. Very few have had normal experiences in social growth and recreation. Although there are other problems, the one that is heard most often, and the one that is presently Enemy No. 1, is inaccessibility!

Professionals in the field of rehabilitation know these truths and are moving forward rapidly with constructive programs of physical restoration and rehabilitation. However, they are finding it very difficult to project clients into normal situations of education, recreation, and employment because of architectural barriers. Therefore, the problems inherent in the design of buildings and facilities quickly take on the role of "villain" and might even tend to reverse some of the social and economic gains now evident in constructive rehabilitation.

Solution of these problems is not within the realm of professional rehabilitation workers, but must be accomplished by those to whom this paper is being presented: the architects, engineers, designers, builders, manufacturers, and in all probability, the legislators, with encouragement and guidance from those professionally engaged in rehabilitation.

With What Are We Concerned?

We are basically concerned with making it possible for the talents and resources of millions of physically handicapped individuals to be put to use for the betterment of mankind by the elimination of architectural barriers. More specifically, it is our intent to develop standards and specifications for all buildings and facilities used by the public, so that they will be accessible and functional for the physically handicapped.

In setting out upon this mission, we must quickly recognize that the majority of buildings which we will be using within the next decade or two are already built. Therefore, our first problem is to determine what might be done to make accessible and functional existing buildings which are now inaccessible. Our second task, and the one I feel is the simpler of the two, is the development of improved standards for design and construction of new buildings and facilities.

With Whom Are We Concerned?

We are concerned with:

1) The nonambulatory disabled, those individuals who, for all practical purposes, are bound to wheelchairs regardless of cause or manifestation.
2) The semi-ambulatory, those individuals who walk with difficulty or insecurity, such as those individuals using braces and/or crutches, amputees, arthritics, spastics, pulmonary and cardiac cases.
3) The sight handicapped, those individuals who are totally blind and those whose sight is impaired to the extent that ambulation in public areas is insecure and hazardous.
4) The incoordinates, those individuals whose disabilities leave them with faulty coordination or palsy from cerebral injury, spinal injury, or peripheral nerve injury.
5) The hearing handicapped, those individuals who are deaf or have a hearing handicap to the extent that they might be insecure in major public areas or in industrial situations, because they are unable to communicate or to hear warning signals.

These are the five basic groups of disabilities with which we must be concerned, each including many disabilities by name, cause, and manifestation, each having specific requirements which, however, may have many common solutions.

Basic Research and Development

Much research has been done which is applicable to this problem, although the researchers may not have had this problem in mind at the time. Therefore, our first research task was to collate all subject matter which was in any way related or applicable to the design and specification of buildings and facilities that would make them accessible and functional for the physically disabled.

Our second research task was to obtain copies of officially recognized standards and determine their degree of applicability to this problem and the manner by which these standards could be modified to serve our purposes with the least amount of change or disorder.

Our first experiment was to construct a ramp for wheelchairs that was adjustable to 32 positions, lengths or pitches, or combinations of length and pitch (Fig. 1). This ramp also had alternating sections equipped with handrails on one side only, or on both sides. The ramp was of permanent construction and located out of doors where varying weather conditions would prevail. We also experimented with both wheeling and walking on various surfaces to determine the coefficients of friction, safety and wearability. Seventy-three wheelchair-bound individuals wheeled up and down the ramp several times at each length, pitch, design, and combinations thereof. Each individual was timed to the tenth of a second. The researchers made observations of the degree of difficulty the participants had in wheeling up and down at each testing, and the subject also rated the degree of difficulty as he saw it. Both tester and subject evaluated the degree of difficulty as very easy, easy, moderately hard, hard, very hard. Impossible ascents and descents were, of course, easily determined. A thesis has been prepared on the research conducted with this experimental ramp.

Another research project was devoted to determining standstill space, straight ahead space, and turning space required by a wheelchair. To do this, one fixed wall and one, two, or three movable walls were used. Basic research also included tests of vertical reach and tests of horizontal reach (Figs. 2, 3, 4).

Another major area of research in which we have engaged is a time study of various severely disabled persons in the activities of normal daily routine, in normal environs, while pursuing a full-time college load.

Research has also been done to determine the applicability of commercially manufactured products in solving the problems associated with making buildings accessible and functional for the physically handicapped. Examples of these include floor covering, floor finishings, door mechanisms and hardware, water coolers, and countless other such items. Other research has been done in the design of specific facilities and equipment such as showers, desks, etc.

The disabled individuals who participated in the research projects were all given specific neurological, muscular and anthropometrical evaluations prior to their participation in each of these projects. They represented various causes and manifestations of disability, various ages and varied circumstances concerning age at onset of disability, and the duration of time the individual had functioned with a disability.

The projects cited are examples of the research we have done, and which is continuing. It would be inappropriate to attempt to list all the research and all the findings from each project, except in those cases where you might later wish to ask specific questions.

Figure 1. Ramp without rest platform.

Figure 2. Turn-around space, using one fixed and three movable wall panels.

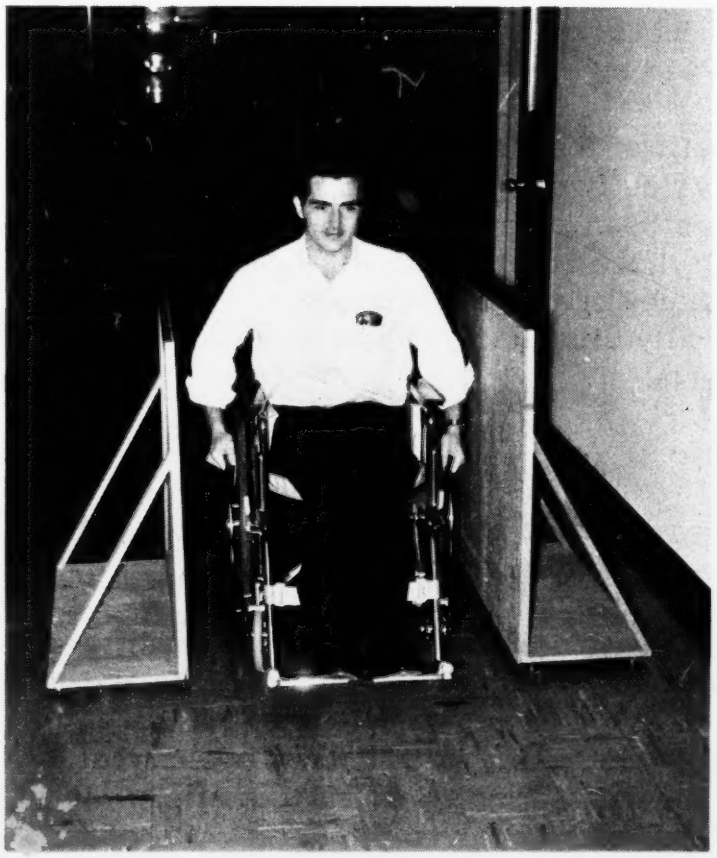


Figure 3. Straight-ahead clearance space, using two movable wall panels.

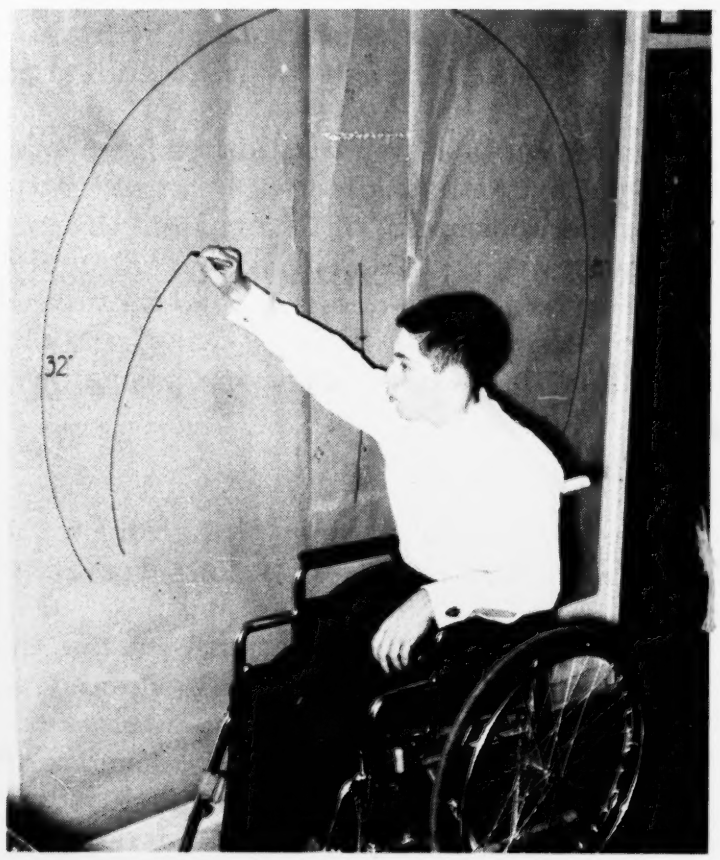


Figure 4. Testing vertical reach at greater than 180° working range.

The University of Illinois and Community of Champaign-Urbana

During the 1959-60 school year, 181 severely and permanently physically disabled students attended the University of Illinois as regular, full-time students. Of these, 122 were confined to wheelchairs all of the time. Many of these students had compound disabilities such as the totally blind with both arms amputated, paraplegia with amputations, ambulatory hemaplegia with amputations, paraplegia with epilepsy, etc. This number included 61 females, 40 confined to wheelchairs.

These students lived in regular university residence halls, attended all regular classes, pursued over 50 curricular objectives in 10 colleges and divisions of the University of Illinois, and participated in almost every phase of extra-curricular activity (newspapers, radio, television, musical and choral groups, fraternities, sororities, various campus governing groups, wheelchair-football, basketball, baseball, track and field, archery, swimming, square dancing, etc.).

These students were not accorded any form of assistance or attendant help while on campus. Facilities have been designed and constructed for their independent use. Entrances, public telephone booths, water coolers, residence hall desks and beds, showers and toilets, cafeteria service, dining areas, even library and laboratory facilities have been designed and constructed so that they are equally usable by the able-bodied and the physically disabled.

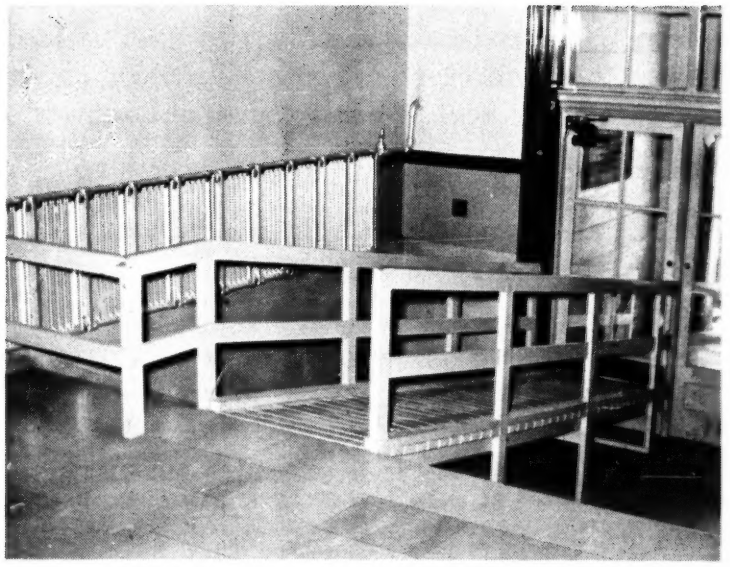
The University of Illinois Rehabilitation-Education Program, now 13 years old, is itself an on-going research program. More than 100 ramps have been built leading into university buildings, each with certain modifications and improvements, a few of which have not proven entirely satisfactory. Countless other modifications have been made to even the oldest and most awkward buildings on campus. We are continually engaged in finding ways to use commercially available products, through proper planning, to make them equally serviceable to disabled and able-bodied alike.

Within recent years, 14 buildings have been built at the University of Illinois, each designed and constructed with the severely physically disabled in mind. Seven churches within the community of Champaign-Urbana have been ramped and made accessible to the severely physically handicapped, including those confined to wheelchairs. Two churches have been designed and built with the physically handicapped in mind. Through cooperative effort by many, the physically disabled are right at home on campus or in the community of Champaign-Urbana.

ASA Project A-117

The next big question was, "What are we doing to remove other architectural barriers to the acceptable, practical, and workable use of buildings?"

In May of 1959, in conjunction with the Annual Meeting of the President's Committee on the Employment of the Physically Handicapped, individuals vitally interested in and/or ably qualified to assist in attacking the problem of architectural barriers were asked to meet with key personnel from the American Standards Assn. At this meeting, it was determined that: the problem of architectural barriers warranted an all-out effort; the American Standards Assn. would accept it as one of its approved projects; co-sponsors of the project would be the President's Committee on the Employment of the Physically Handicapped and the National Society for Crippled Children and Adults; and the principal financial support would be granted by the NSCCA.

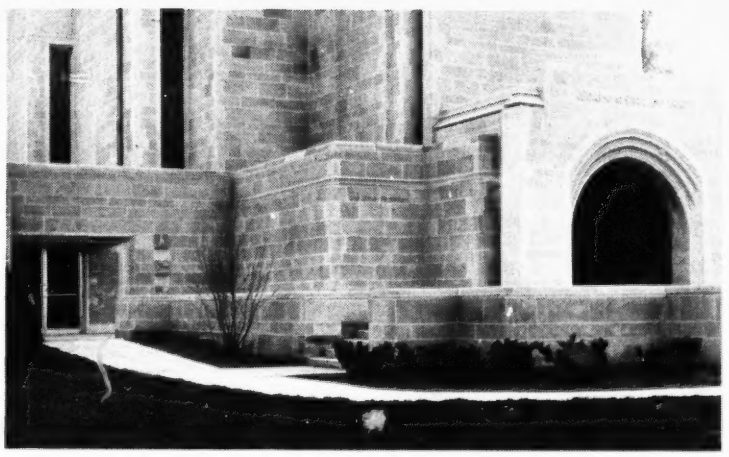


Figures 5 & 6. Much-used University building has been equipped with ramps outside and inside of entrance door, with one door shortened and re-hinged, to accommodate wheelchairs.

Figure 7. City transit buses have hydraulic lifts in front for wheelchair users.

Figure 8. (Above) Addition of ramp blends effectively with sidewalk and surroundings.

Figure 9. (Right) Church design utilizes landscaping and proper planning to provide ground level entrance for the handicapped.



Subsequently, a Steering Committee of seven was appointed. Mr. Leon Chatelain, Jr., Washington architect, is chairman of the Steering Committee, and Prof. Timothy J. Nugent (the author) is secretary. The American Standards Assn., the co-sponsors, and other vitally interested and qualified individuals and agencies are represented on the Steering Committee.

A Sectional Committee was also selected, members of which represent over 50 professions, trades, associations, societies and government agencies.

The project is officially known as Project A-117 of the American Standards Assn., "Making Buildings and Facilities Accessible and Usable to the Physically Handicapped." The National Society for Crippled Children and Adults awarded a research grant in the amount of $19,217 (18 months) to the author, who then assumed the role of Director of Research and Development and Executive Secretary to Project A-117. Although a major portion of the administration, research and development for this project is being done at the University of Illinois under this research and development grant, all members of the Sectional Committee bring ideas and problems to meetings, where they are discussed and resolved. Many of the members of the Sectional Committee are outstanding authorities in areas related directly or indirectly to Project A-117.

A comprehensive and very detailed Work Outline[1] was developed by the Steering Committee and the Sectional Committee of this project. With this as a guide, each committee member investigates independently specific areas of the project which relate to his basic interests and knowledge. The author and his research assistants are presently developing an answer to each item within the Work Outline and an explanation sheet to define the method by which each answer was determined.

Of course, basic research and development are continuing all the time. Illustrations are being prepared so that the ultimate results of the project can be assembled into a publication.

When the Steering Committee and the Sectional Committee of Project A-117 are in complete agreement upon standards that will eliminate architectural barriers to the physically handicapped, these will be referred to the American Standards Assn. for review, evaluation and acceptance. This review is done by several boards of the American Standards Assn., such as their Construction Board, etc.

Once these standards have been accepted and published by the American Standards Assn., we hope to disseminate this information to all professional and volunteer organizations and agencies interested in this problem, as well as to all legislative bodies, municipal and state, in the hope that these standards will soon become a part of municipal and state building codes and a part of the common practice of all those engaged in the design and construction of buildings and facilities.

The author has already prepared in behalf of the NSCCA brief statements and survey sheets which were distributed to all representatives at the National Conference of the Society. Several communities and one or two states have already formulated positive plans for attacking these problems as soon as the standards are properly developed and wholly acceptable.

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(1) See Appendix.

SUMMARY

The severely, permanently, physically disabled can be accommodated in all buildings and facilities used by the public:

1) Independently and without distinction.
2) Without loss of space or function to the general public.
3) Without extra cost.

All standards which will be recommended to benefit the permanently physically handicapped will be of benefit to everyone.

The standards herein referred to can be incorporated in any type of building regardless of the basic architectural concept. For example, one of the older buildings on campus presented insoluble problems in regard to ramping at any of the established entrances. Subsequently, a ramp was placed in a long basement window areaway, the window was converted into a rather shallow door, and an interior ramp was built from the sill of the window to the basement floor. A false wall was also constructed as a corridor for the ramp. Within two weeks, 82% of all the faculty, staff and students using that building entered and left by way of this ramp, even though there are several other entrances to the building.

The foldaway shower seats which make it possible for an ambulatory person and one in a wheelchair to use the same shower stall, quickly and in any order, were expected to last several years. When the first set of seats wore out in less than six months, an investigation revealed that all of the able-bodied students preferred to use the showers with the seats down. There are many other examples of this nature.

A little coordinated planning can open up many new worlds to millions of people. We are wasting shameful amounts of money and human resources because we have overlooked some relatively simple things. We must make buildings and facilities accessible and useful to the severely physically handicapped. This is a challenge to architects, engineers, builders, manufacturers, and all professional people.

APPENDIX

WORK OUTLINE—AMERICAN STANDARDS ASSOCIATION—PROJECT A-117

I. INTRODUCTION

A. With what are we concerned?

1) Developing standards for all buildings and facilities used by the public so that they will be accessible to and functional for use by the physically handicapped, in terms of entrance, exit and the entire building interior.

a) Those things which might be done to make accessible existing buildings which are now nonaccessible.

b) The proper design and construction of new buildings and facilities.

2) Making it possible for the great talents and resources of millions of physically handicapped individuals to be put to use for the betterment of all mankind, by the elimination of architectural barriers.

B. With whom are we concerned?

1) Non-ambulatory—those individuals who for all practical purposes are bound to wheelchairs, regardless of cause or manifestation.

2) Semi-ambulatory—those individuals who walk with difficulty or insecurity such as those using braces and/or crutches, amputees, arthritics, spastics, pulmonary and cardiac cases, etc.

3) Sight handicapped—those individuals who are totally blind or those whose sight is impaired to the extent that ambulation in public areas is insecure and hazardous.

4) Incoordinates—those individuals with incoordinate movements or palsy from cerebral injury, spinal injury, or peripheral nerve injury.

5) Hearing handicapped—those individuals who are deaf or have a hearing handicap, to the extent that they might be insecure regarding warning signals, etc., in major public areas, industrial areas, etc.

These are the five basic groups of disabilities with which we must be concerned, each having specific needs or requirements different from the others while at the same time having many common resolves or solutions by specification. Each of these groups includes many disabilities by name, cause, and manifestation.

C. General items of concern which need subcommittee investigation:

1) Floor surfaces and stair treads.

2) Hardware—fixtures.

3) Hardware—mechanical.

4) Emergency evacuations—fire escapes, etc.

5) Operating controls—switches, fuse boxes, outlets, elevator door devices, etc.
6) Plumbing fixtures.
7) Construction standards as they exist.
8) Fixed equipment common to public lodging and eating places.

D. Specific items basic to our considerations:
1) Specifications of standard wheelchair.
2) Turning radius and turning area of standard or average wheelchair.
3) Passing width required for standard or average wheelchair in motion.
4) Average reach in all directions for average individual while in a wheelchair.
5) Crutch clearances.

II. SITE PLANNING

A. Landscaping—This is the most effective means to resolve the problems created by topography, definitive architectural design or concepts, water table, existing streets, and atypical problems, singularly or collectively, so that aggress, ingress and egress to buildings by severely physically handicapped can be facilitated while preserving the desired design and effect of the buildings' architecture.

B. Blending of all crosswalks and drives—Wherever sidewalks cross other sidewalks, driveways, or parking lots, they should blend to a common level. This does not mean the elimination of curbs.

C. Sidewalks and drives:
1) Width.
2) Incline.
3) Surface.

D. Parking lots:
1) Access.
2) Definition of parking spaces—width.
3) Distribution.

E. General agress, ingress and egress.

III. BUILDING ENTRANCES AND EXITS

A. Ground level entrances and exits.

B. Improvisations to existing buildings now nonaccessible:
1) Changes in landscape.
2) Changes in entrance construction.
3) Creation of new entrance.
4) Ramps:
a) Incline or pitch.
b) Length in relation to incline or pitch.
c) Width.
d) Surface.
e) Handrails (See III - D - 5 - a through f).
f) Methods and materials of construction.

C. Material and texture of adjoining surfaces.

D. Steps:
1) Height of risers.
2) Depth of treads.
3) Width of steps.
4) Design—nosing.

5) Handrails:
   a) Height.
   b) Type of mounting.
   c) Shape and thickness—diameter.
   d) Material.
   e) Clearances.
   f) Extension beyond steps (or ramp) at top and bottom.
6) Definition of top step and bottom step.

E. Doorways (exterior):
1) Clearance of doorway.
2) Threshold.
3) Closing and opening mechanisms.
4) The door:
   a) Weight.
   b) Width.
   c) Construction.
   d) Vision Panels.
5) Hardware:
   a) Placement.
   b) Minimum specifications of design.
   c) Mechanical advantage.
   d) Texture of panic bars.

F. Windows:
1) Style or design.
2) Placement.
3) Opening and closing mechanisms.
4) Attachments:
   a) Blinds, shades, shutters.
   b) Draperies.
   c) Storm windows and screens.
   d) Controlling mechanisms for each.

IV. INTERIORS, GENERAL

A. Floors:
1) Common level or blending levels (no steps).
2) Surface—nonskid.
3) Surface—definition at point of change, such as steps and elevators.

B. Corridors:
1) Width—free areaway unobstructed by pillars or protrusions:
   a) Passing space.
   b) Turning space.
   c) Waiting space.
   d) Handrails.

C. Doorways (interior):
1) Doorway clearance.
2) Type of door.
3) Type of hinging.
4) Combination of doors.
5) Hardware.
6) Vision panels.
7) Thresholds.

D. Minimum areaways within specific offices, rooms, assembly areas:
   1) Passing widths.
   2) Turning radius.
   3) Minimum approach to fixed equipment.
   4) Minimum approach to desks, tables, machines.

E. Directory Boards:
   1) Height.
   2) Placement.
   3) Protrusion.

F. Mail chutes:
   1) Height of opening.

V. RESTROOMS

A. Entrance to restrooms (clearances for wheelchair).

B. Interior space requirements:
   1) Wheelchair clearances:
      a) Turning.
      b) Passing.
      c) Approach.

C. Lavatories:
   1) Design (apron).
   2) Drain pipe.
   3) How mounted.
   4) Type of handle.

D. Urinals:
   1) Wall-mounted vs. floor-mounted.
   2) No step-up or step-down to urinals.
   3) Height of wall-mounted urinals.
   4) Method of installation.

E. Toilet stalls:
   1) Wheelchair clearance and approach to stalls.
   2) Width of stalls.
   3) Depth of stalls.
   4) Width of door to stall.
   5) Hinging of door to stall (door should swing out—not in).
   6) Location of stall within toilet room.
   7) Bars or handrails within specific stalls:
      a) Height of bar.
      b) Material of bar.
      c) Thickness (diameter) of bar.
      d) Clearance from wall.
      e) Match existing hardware design and finish.
   8) Closet Bowl:
      a) Wall-mounted vs. floor-mounted.
      b) Choice of design (from existing commercial sources).

F. Distribution:
   1) Number of toilet stalls per toilet room.
   2) Number of toilet stalls per toilet room per floor of building.
   3) Number of toilet stalls per toilet room per total building.
   4) A formula involving numbers of people (all) involved that would be applicable to all sizes and types of buildings.

G. Supplementary items:
    1) Mirrors.
    2) Medicine cabinets and/or first aid kits.
    3) Paper holders.
    4) Towel dispensers and/or electric dryers:
        a) Height of G1, 2, 3, 4.
        b) Placement of G1, 2, 3, 4.
    5) Showers (See VIII-E-1-a thru f).
    6) Tubs (See VIII-E-1-g).

VI. SAFETY FACTORS OR PRECAUTIONS
- A. Floor surfaces.
- B. Radiators, vents, heating pipes, hot water pipes, drain pipes, etc.
- C. Open wells in stairs.
- D. Open window areaways or light wells.
- E. Protruding objects.
- F. Excavations - (clicking warning lights).
- G. Basement access from the sidewalk.
- H. Manholes.
- I. Emergency warning signals:
    1) Sight-handicapped—sound.
    2) Hearing-handicapped—visual.
- J. Emergency evacuations.

VII. SUPPLEMENTARY FACILITIES
- A. Elevators:
    1) Size and shape of elevator.
    2) Type of door or doors.
    3) Type and placement of controls (exterior).
    4) Leveling.
    5) Controls within elevator:
        a) Location of control panel.
        b) Height of control panel from floor.
        c) Identification of controls (floors).
        d) Sequence of numbering or identifying floors.
    6) Escalators.
    7) Moving sidewalks.
- B. Raised numerical identifications for blind.
- C. Water coolers:
    1) Design.
    2) Placement.
    3) Height.
    4) Controls.
- D. Telephone (public):
    1) Elimination of conventional phone booths.
    2) Hear-here phone stations:
        a) Height from floor.
        b) Specific design of hear-here type phone stations.
    3) Location of directories.
    4) Volume control phones for hard-of-hearing.
- E. Coat racks, cloak rooms, type of locker space.
- F. Fire alarm boxes, first aid kits, emergency equipment.
- G. Light switches, heating and ventilating controls.
- H. Emergency exits and emergency evacuation procedures in case of power failure.

I. Service exits and irregular exits.
J. Handrails (III - D - 5 - a through f).

VIII. FACILITIES FOR PUBLIC EATING AND LODGING

All items of concern (and subsequent specifications) previously listed would be applicable to this unit but additional items must also be considered.

A. Restaurant—cafeteria style:
   1) Width of cafeteria self-service aisle.
   2) Height of tray collection rack.
   3) Height of self-service tables and racks (serving lines).
   4) Accessibility of water dispenser, milk dispenser, etc.

B. Restaurant—table service style:
   1) Width of aisles between tables.
   2) Design of tables, particularly fixed tables, etc.

C. Restaurant—hotel dining room:
   1) All specifications heretofore determined plus special concern for the placement of the dining room in the hotel scheme, particularly as to common levels of floor.

D. Motels and hotels—lodging:
   1) All specifications heretofore developed would be applicable to this area of concern.
   2) Size of sleeping rooms.
   3) Location of bathroom within sleeping room or in relation to sleeping room.
   4) Specific placement (or adaptation of particular specifications) for essential equipment within the bathroom.
   5) Grab bars.
   6) Possible considerations:
      a) The requirement that each motel or hotel have one small interior type wheelchair and one portable seat for shower or tub to be used by wheelchair individuals, just as they now have blackboards and other special items for use by hotel and motel tenants and those using the facilities for meetings, etc.
      b) Specifications for furniture and fixed equipment within hotels, particularly hotel rooms.

E. Residence halls—dormitories in schools, colleges, etc.

All specifications heretofore developed would be applicable here with additional particular concern for some of the following:

1) Group bath facilities:
   a) Type of shower.
   b) Shower seat (usable by able-bodied and wheelchair users).
   c) Water diversion valve.
   d) Water testing outlet.
   e) Safety grab bar.
   f) Drying space and approach to and from shower stall.
   g) Tub specifications (although undesirable, may be wanted).
2) Toilet stalls:
   a) Same specifications would be adhered to here as in V-E with perhaps a different formula for distribution.
3) Urinals:
   a) Same specifications would be adhered to here as in V-D with consideration of a different formula for distribution.

4) Lavatories:
a) Same specifications as in V-C would be adhered to here.

IX. PUBLIC RECREATION AND ASSEMBLY AREAS

The following general recreation assembly areas would be adequate if they adhered to the specifications previously accounted for, but this fact must be made clear, and in a few instances some additional emphasis must be made:

A. Theaters:
1) Theater aisles have always proven of adequate width, but it might be desirable that this point be specified.
2) It must be assumed that the severely handicapped will become participants as well as spectators in theaters and auditoriums, therefore the following should be accounted for:
a) Aggress to stages and participation areas.
b) Aggress, ingress and egress to some dressing rooms, etc.

B. Municipal auditoriums:
1) It must be assumed that the severely handicapped will become participants as well as spectators in theaters and auditoriums, therefore the following should be accounted for:
a) Aggress to stages and participation areas.
b) Aggress, ingress and egress to some dressing rooms, etc.

C. Libraries.

D. Sports arenas:
1) It must be assumed that the severely handicapped will become participants as well as spectators in sports arenas, therefore the following should be accounted for:
a) Aggress to areas of participation.
b) Aggress, ingress, and egress from locker rooms, shower facilities, etc.

E. Natatoriums and swimming pools (interior and exterior):
1) Direct approach to the swimming pool.
2) Width of walk around interior pool.

F. Public stadiums:
1) All specifications previously considered and developed would be applicable here, even with the great diversity of purpose in the use of public stadiums.

G. Churches:
1) All specifications previously developed would be applicable here, even with the great diversity of physical components of churches.

H. Industries:
1) All specifications previously developed would be applicable here, even with the great diversity of purpose in the use of a particular industrial building.
2) Of special concern:
a) Mounting of machinery.
b) Placement of controls.
c) Warning devices.

I. Transportation terminals:
1) Rail.
2) Air.
3) Bus.
4) Boat.
5) Urban and inter-urban.